

REMARKS

Reconsideration of the application in view of the above amendments and the following remarks is requested. Claims 2-5, 8-10, 26, 33-36, and 45-55 are in this application. Claim 6 has been cancelled. (Claims 1, 7, 11-25, 27-32, and 37-44 were previously cancelled.) Claim 52 has been amended to correct an inadvertent error. Claims 2-5, 8-10, and 45-49 have been allowed.

Applicant requests the Examiner's permission to make the changes shown in red on the annotated copies FIGS. 3B, 4B, 5B, 6B, 7B, 8B, 9B, 10B, 11B, and 12B attached to this amendment in Appendix A. The changes to the drawings include the addition of a number of reference numerals to label structures shown within the drawings. The specification has also been amended to reflect the changes to the drawings. In addition, applicant has also attached a replacement set of drawings in Appendix B that include replacement sheets for the figures which have been amended, along with copies of the formal drawings filed on July 30, 2002.

The Examiner rejected claims 26, 33-36, and 50-55 under 35 U.S.C. §112, first paragraph. With respect to claim 26, the Examiner argued that the specification does not disclose a first dielectric material that lies in a first region that lies horizontally entirely between the second and third metal lines. The Examiner also argued that the specification does not disclose a second dielectric material that is formed over the first region.

Applicant has included an annotated version of applicant's FIGs. 12B to aid in the following discussion. With reference to the annotated drawing, FIG. 12B shows an isolation layer, which is labeled "layer of isolation material", and a metal-1 layer with a left metal line, a center metal line, and a right metal line that are labeled first, second, and third metal lines, respectively.

In addition, FIG. 12B shows an area labeled first space, which is defined to lie between the first and second metal lines, and an area labeled second space, which is been defined to lie between the second and third metal lines. Applicant brings the

Examiner's attention to the fact that the second space lies "horizontally entirely between the second and third metal lines." Further, within the second space, an area labeled first region has been defined to contact the side wall surface of the second metal line.

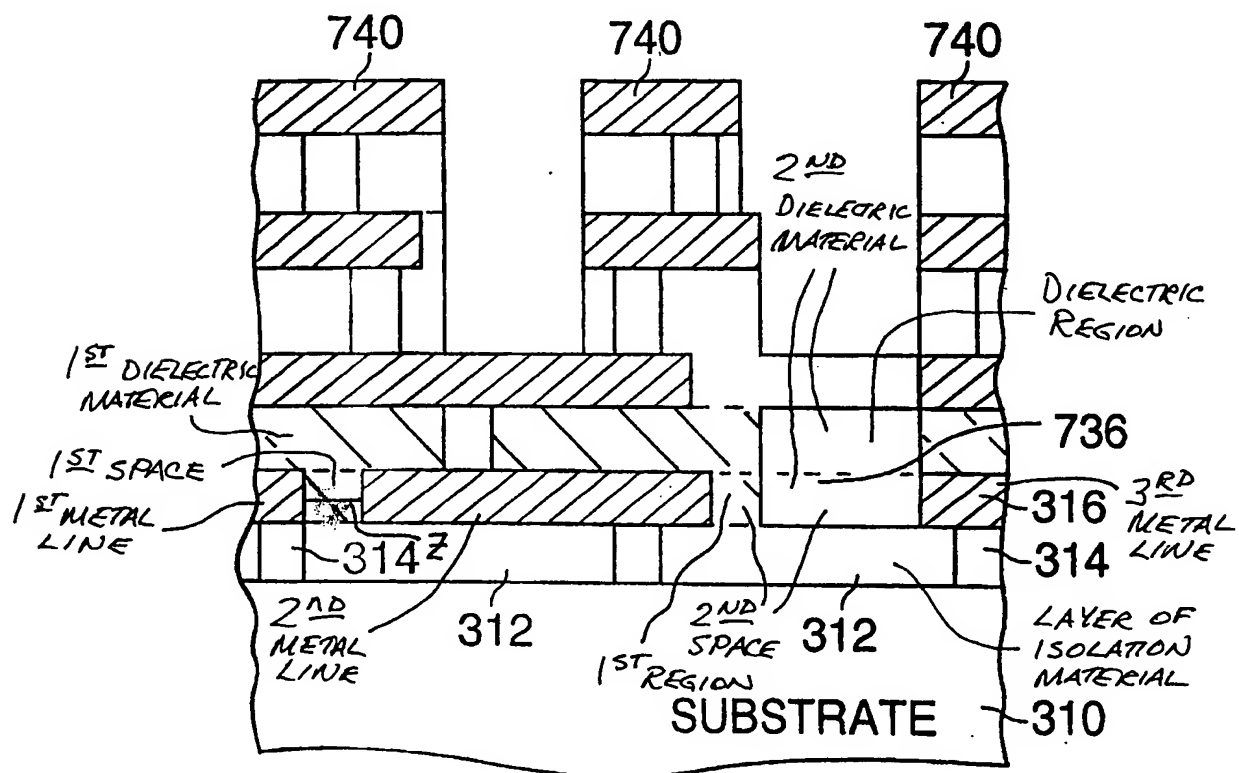


FIG. 12B

FIG. 12B also shows a dielectric material layer, which is the hatched region labeled first dielectric material, and a dielectric structure, which is labeled second dielectric material. In addition, within the dielectric structure (labeled second dielectric material), a dielectric material block, labeled dielectric region, can be defined.

Thus, FIG. 12B shows a layer of isolation material, first, second, and third metal lines, a first dielectric, and a second dielectric. Further, FIG. 12B shows first and second spaces, a first region, and a dielectric region. As a result, applicant's specification necessarily discloses a layer of isolation material, first, second, and third metal lines, a first dielectric, and a second dielectric, along with first and second spaces, a first region, and a dielectric region.

Claim 26 recites, in part,

“a layer of isolation material;
“a first plurality of metal lines that lie in substantially a first horizontal plane, the first plurality of metal lines including first, second, and third metal lines formed on the layer of isolation material, the first, second, and third metal lines each having a top surface, a bottom surface, and side wall surfaces that contact the top and bottom surfaces;
“a first dielectric material, the first dielectric material
being formed between the first and second metal lines so that the first dielectric material contacts the side wall surface of the first metal line at a point and extends horizontally from the point to contact the side wall surface of the second metal line,
lying in a first region that lies horizontally entirely between the second and third metal lines so that the first dielectric material contacts the side wall surface of the second metal line, and
contacting the top surfaces of the second and third metal lines;
and
“a second dielectric material formed over the first region, the second dielectric material contacting the first dielectric material and having a dielectric constant different from a dielectric constant of the first dielectric material.” [Additional indentations added for clarity.]

The layer of isolation material of claim 26 can be read to be, for example, the area labeled “layer of isolation material” in the annotated version of FIG. 12B. The first plurality of metal lines of claim 26, including the first, second, and third metal lines, can be read to be, for example, the areas labeled first, second, and third metal lines in the annotated version of FIG. 12B.

The first dielectric material of claim 26 can be read to be, for example, the area labeled first dielectric material in the annotated version of FIG. 12B. As shown

in FIG. 12B, the first dielectric material is formed between the first and second metal lines. In addition, a line, such as line Z shown in the annotated version of FIG. 12, contacts the side wall of the first metal line and extends horizontally over to the side wall of the second metal line through the first dielectric material.

Further, the first region of claim 26 can be read to be, for example, the area labeled first region in the annotated version of FIG. 12B. Applicant brings to the Examiner's attention the fact that, as required by claim 26, the first dielectric material shown in the annotated version of FIG. 12B lies in the first region, and contacts the side wall of the second metal line.

The last limitation of the first dielectric material in claim 26 is that the first dielectric material contact the top surface of the second and third metal lines. As shown in the annotated version of FIG. 12B, the area labeled first dielectric material contacts the top surface of the second and third metal lines as required by claim 26. Thus, all of the limitations of the first dielectric material are supported by applicant's specification.

The second dielectric material of claim 26 can be read to be, for example, the area labeled second dielectric material in the annotated version of FIG. 12B. As shown in FIG. 12B, the second dielectric material contacts the first dielectric material. In addition, the dielectric region of the second dielectric material lies over the first dielectric material. FIG. 12B does not show that the second dielectric material within the dielectric region lies directly over the first dielectric material, but claim 26 does not require this. Claim 26 only requires that the second dielectric material lie over and contact the first dielectric material. The second dielectric material shown in FIG. 12B discloses these limitations.

In responding to applicant's comments in the last amendment, the Examiner stated:

"The specification (fig. 12b) discloses the first dielectric material (312) lies in a portion of a first region that lies horizontally between the second and third metal lines. Additionally, the specification (figure 12b) also shows

another dielectric material (736) lies between the portion of a first region of second and third metal lines. Therefore, how can the first dielectric material (312) lies horizontally entirely between the second and third metal lines when another dielectric material (736) lies in the same horizontal between the second and third metal lines?"

Applicant notes that claim 26 does not recite that the first dielectric material lies horizontally entirely between the second and third metal lines. Rather, claim 26 recites that a first region lies horizontally entirely between the second and third metal lines. Applicant further notes that, like the first region shown in the annotated version of FIG. 12B, there is nothing in claim 26 which requires that the first region of claim 26 occupy all of the volume that exists between the second and third metal lines.

Claim 26 recites that the first region lies horizontally entirely between the second and third metal lines, and that the first dielectric material lie in the first region. The annotated version of FIG. 12B shows that the area labeled first region lies horizontally entirely between the second and third metal lines (and does not consume all of the volume that lies horizontally entirely between the second and third metal lines), and that the first dielectric material lies in the first region.

Thus, from what applicant can determine, claim 26 satisfies the requirements of the first paragraph of section 112. In addition, since claims 33-35 depend either directly or indirectly from claim 26, claims 33-35 satisfy the requirements of the first paragraph of section 112 for the same reasons as claim 26.

With respect to claim 36, applicant notes that all of the comments set forth above regarding FIG. 12B apply equally well to applicant's FIG. 5B. Thus, claim 26, which claim 36 depends from, reads on both FIGS. 5B and 12B. Applicant has included an annotated version of applicant's FIGS. 5B, which has been marked in the same manner as FIG. 12B, to aid in the following discussion.

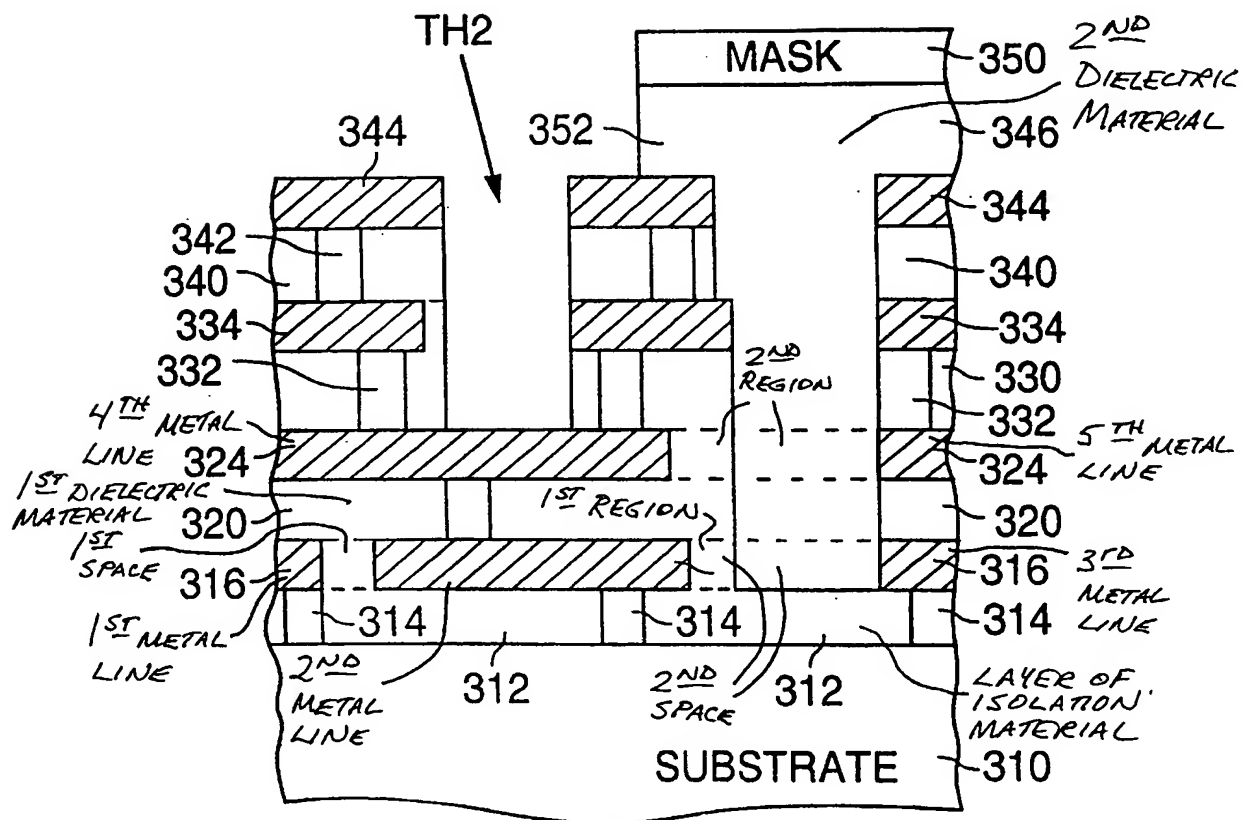


FIG. 5B

With reference to the annotated drawing, FIG. 5B shows a dielectric structure, which is labeled second dielectric material. In addition, a space labeled second region is defined to lie between the fourth and fifth metal lines. Applicant brings the Examiner's attention to the fact that the second region shown in the annotated version of FIG. 5B lies "horizontally entirely between the fourth and fifth metal lines."

In addition, as shown in FIG. 5B, a portion of the second dielectric material lies on and over the second region. FIG. 5B does not show that all of the second dielectric material lies on and over the second region, but claim 36 does not require this. Claim 36 only requires that the second dielectric material lie on and over the second region, which is what is shown in FIG. 5B.

In rejecting claim 36, the Examiner stated:

"The specification never discloses the second dielectric material is formed over the second region as claimed in claim 36. The specification (fig. 12b) discloses the second dielectric material is formed on the fourth metal line and the fifth metal line."

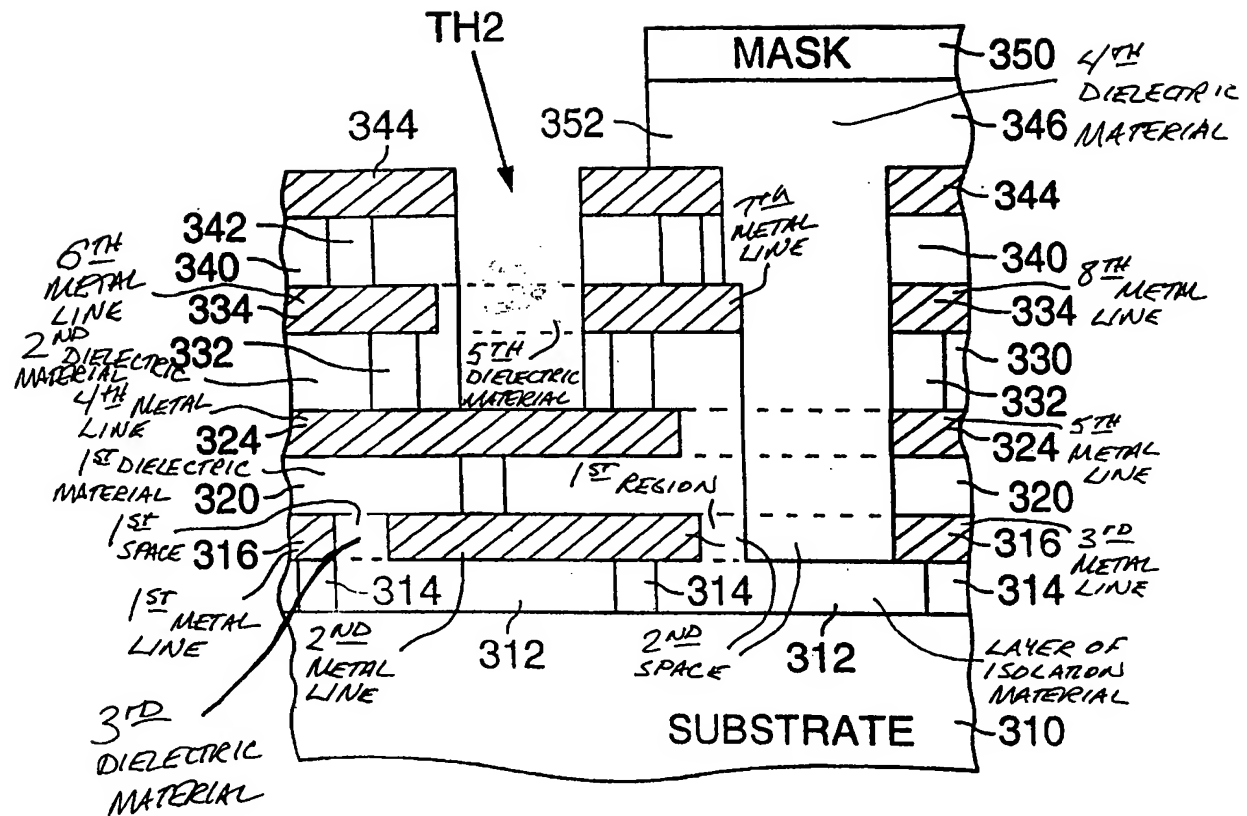
Applicant, however, is unclear which structure the Examiner is reading to be the second dielectric material. Thus, from what applicant can determine, claim 36 is supported by applicant's FIG. 5B and thus satisfies the requirements of the first paragraph of section 112.

With respect to claim 50, applicant has included a second annotated version of applicant's FIGs. 5B to aid in the following discussion. In rejecting claim 50, the Examiner stated:

"The specification never discloses a fourth dielectric material formed between the second and third metal lines and the fourth and fifth metal lines as claimed in claim 50. How can the fourth dielectric material (346) [be] formed between the second and third metal lines when another dielectric material (312) [is] formed between the second and third metal lines? There are two portions of two dielectric materials (one is 346 and another is 312) formed between the second and third metal lines."

It appears from the Examiner's comments that the Examiner believes that claim 50 requires that all of the volume that lies between the second and third metal lines be filled with the fourth dielectric material. Applicant, however, is not aware of any limitation in claim 50 that requires all of the volume that lies between the second and third metal lines be filled with the fourth dielectric material.

Rather, claim 50 requires that the fourth dielectric material be formed between the second and third metal lines, and between the fourth and fifth metal lines. As shown in the second annotated version of FIG. 5B, the fourth dielectric material is formed between the second and third metal lines, and between the fourth and fifth metal lines. This does not, however, prevent another dielectric material from also lying between the second and third metal lines.

**FIG. 5B**

With respect to claim 51, in the last amendment, applicant explained how the sixth dielectric material can be read onto applicant's FIG. 6B. In the present office action, the Examiner indicated that applicant's argument was not convincing because the fourth and sixth dielectric materials are the same. The Examiner also stated that the sixth dielectric material can not be an air dielectric.

Applicant respectfully does not understand the Examiner's arguments. From the Examiner's comments, applicant can only assume that the Examiner believes that for some reason FIG. 6B can not be used to provide support for claim 51. However, applicant does not know if this assumption is correct and, if correct, why the Examiner believes this. Applicant knows of no reason why FIG. 6B can not be

used to provide support for claim 51. With respect to claim 52, the Examiner appears to have rejected claim 52 because claim 51 was rejected.

With respect to claim 54, the Examiner stated:

"The specification never discloses [that] the third dielectric material is also formed within a region that lies in the first horizontal plane between the second and third metal lines as claimed in claim 54. How can the third dielectric material (the dielectric material that lies between the left and center metal lines of metal-1 layer 316) [be] formed within a region that lies in the first horizontal plane between the second and third metal lines when another dielectric material (346) [is] formed within a region that lies in the same plane between the second and third metal lines (figure 5B)?

As with the discussion of claim 50, claim 54 does not require that the third dielectric material occupy all of the volume that lies between the second and third metal lines. With respect to claim 55, the Examiner appears to have rejected claim 55 because claim 50 was rejected. Thus, from what applicant can determine, claims 50-55 satisfy the requirements of the first paragraph of section 112.

In the Response to Arguments section, the Examiner twice states that "[t]his argument is not convincing because figure 5B and 12B are not in the same embodiment." Applicant respectfully does not understand the Examiner's comment. Claims 26 and 36 can be read on both the structure shown in applicant's FIG. 5B and the structure shown in applicant's FIG. 12B. In other words, applicant's FIGS. 5B and 12B both provide support for the limitations recited in claims 26 and 36.

The Examiner rejected claim 6 under 35 U.S.C. §103(a) as being unpatentable over Koo et al. (U.S. Patent No. 6,262,446). As noted above, claim 6 has been cancelled.

Thus, for the foregoing reasons, it is submitted that all of the claims are in a condition for allowance. Therefore, the Examiner's early re-examination and reconsideration are requested.

Respectfully submitted,

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APPENDIX A

Annotated Marked-Up Drawings (in red) of FIGS. 3B, 4B, 5B, 6B, 7B, 8B, 9B, 10B, 11B, and 12B.

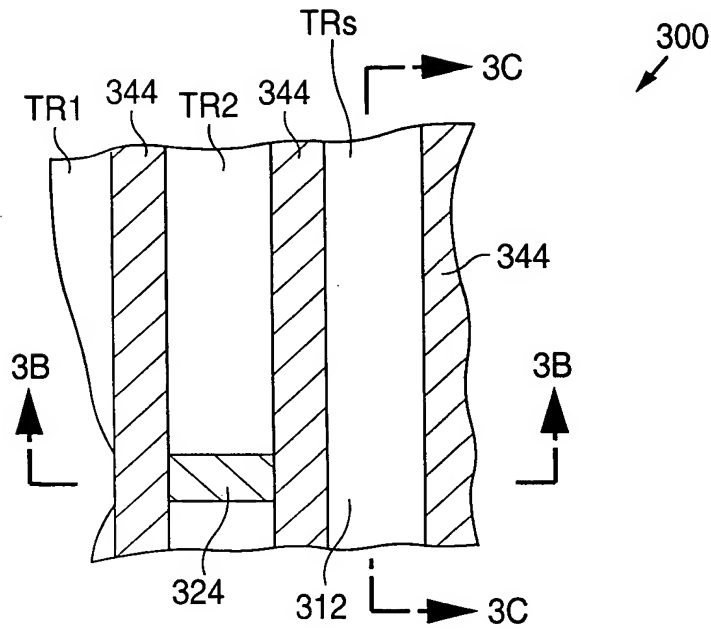


FIG. 3A

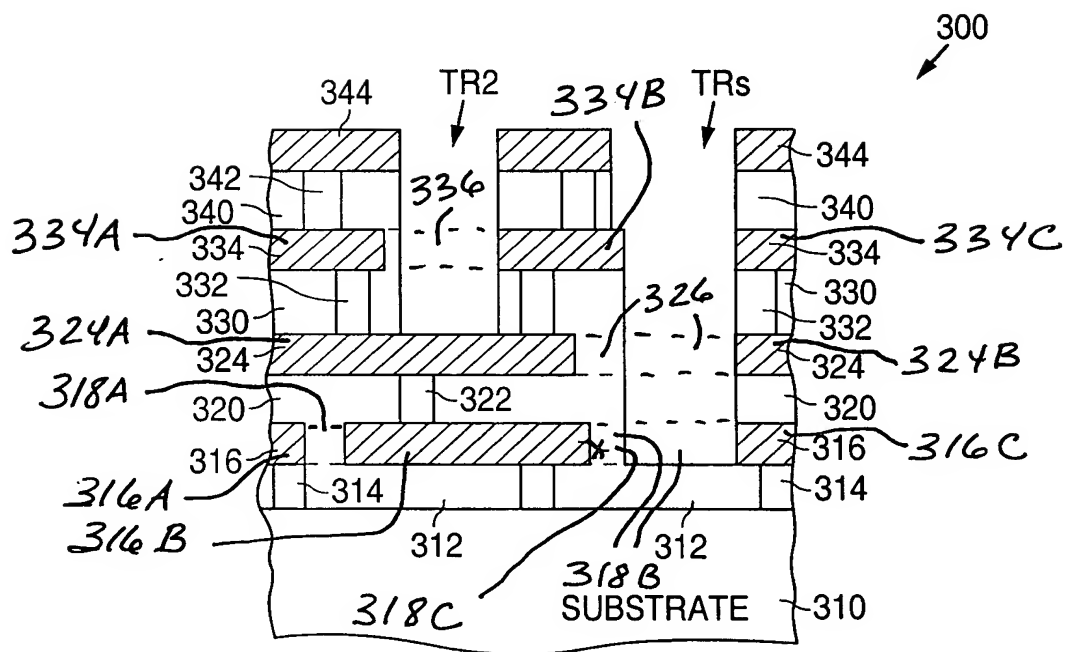


FIG. 3B

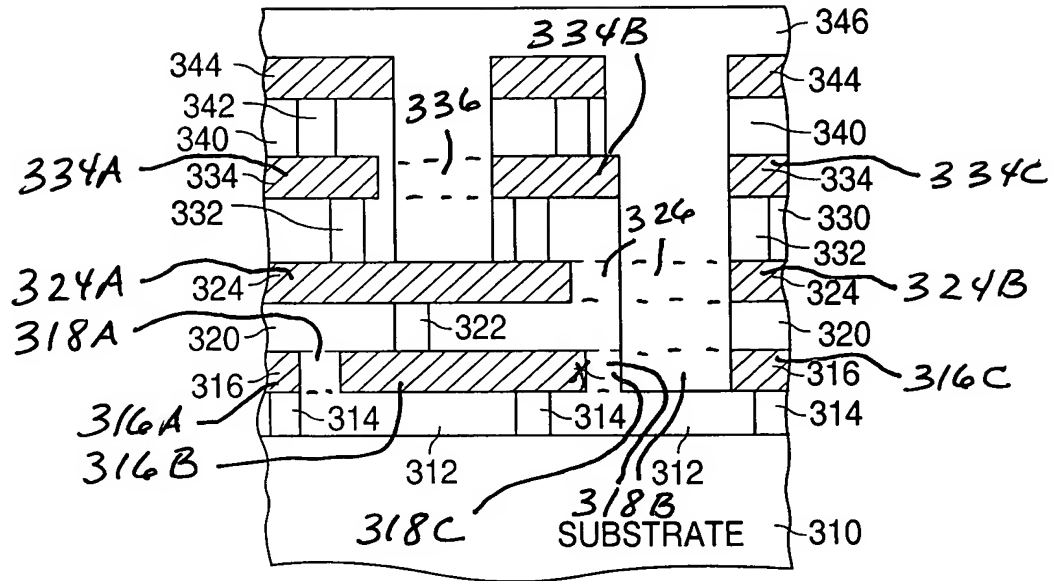


FIG. 4B

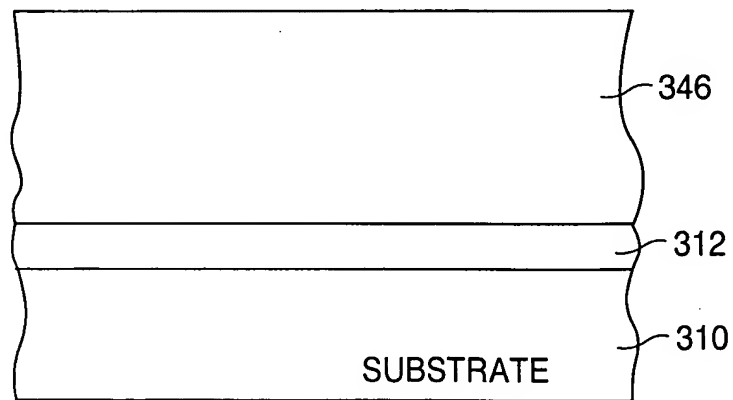


FIG. 4C

Annotated Marked-up Drawing

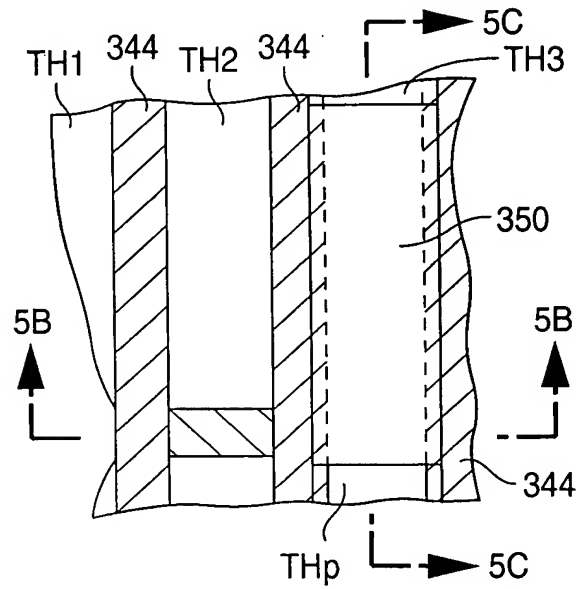
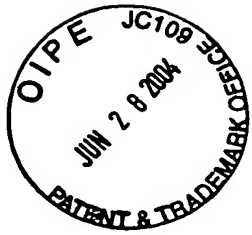


FIG. 5A

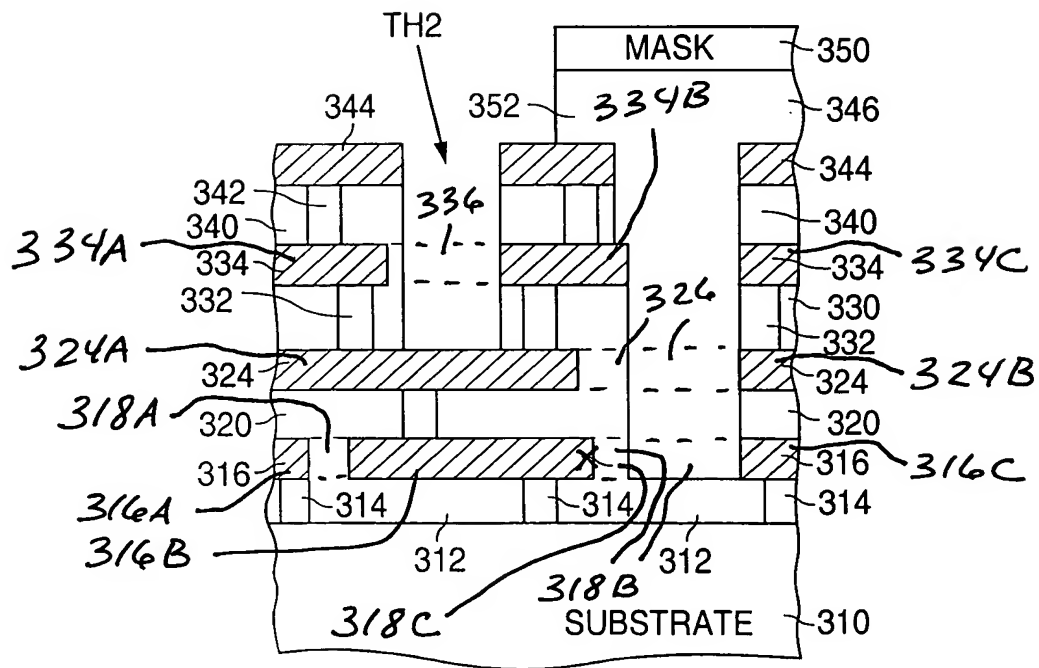


FIG. 5B



Annotated Marked-up Drawing

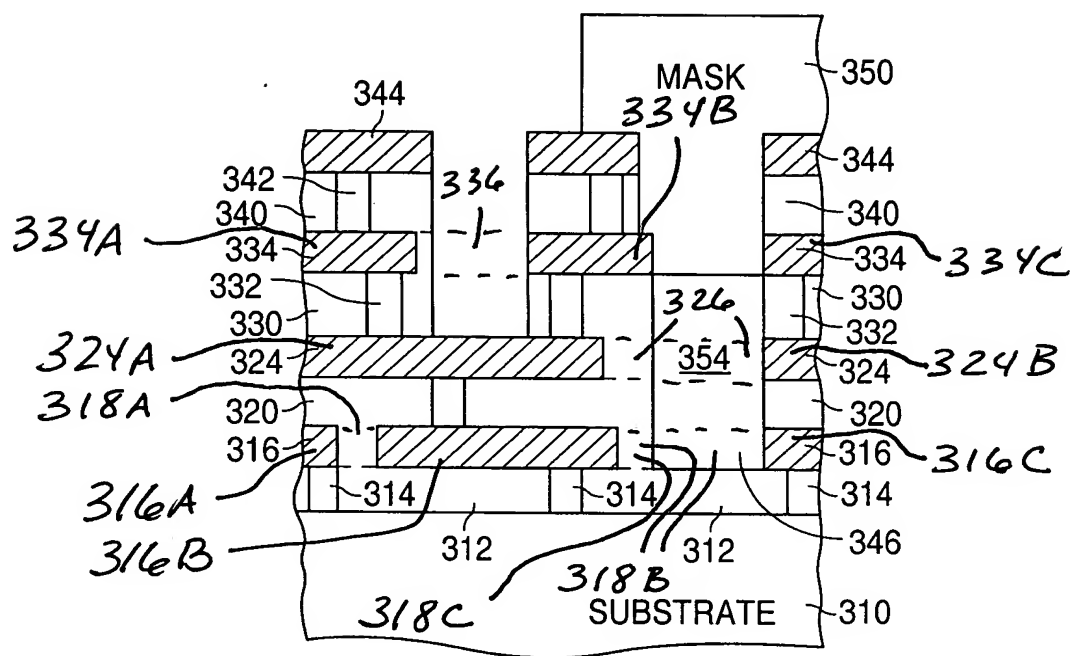


FIG. 6B

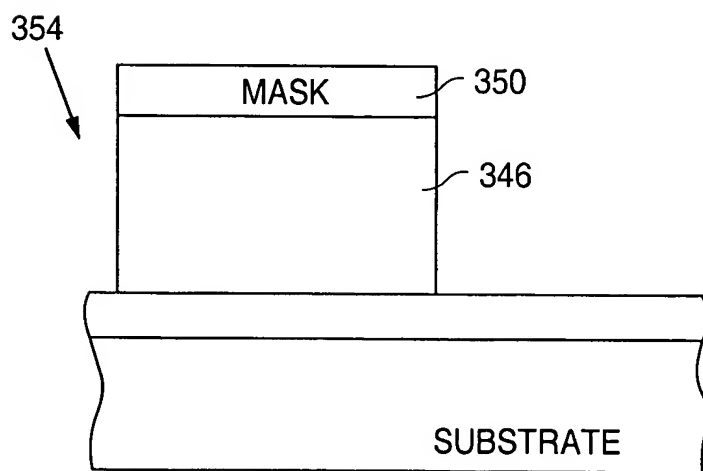


FIG. 6C

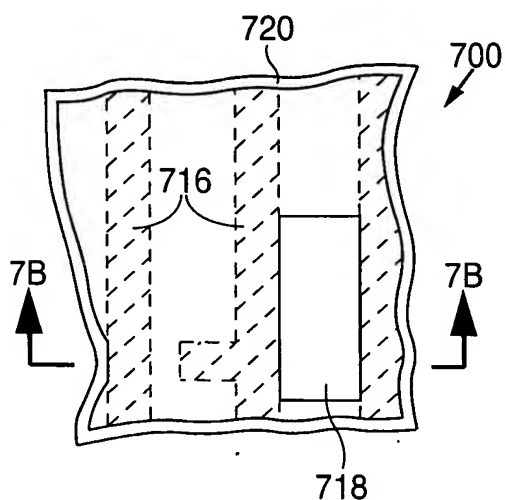


FIG. 7A

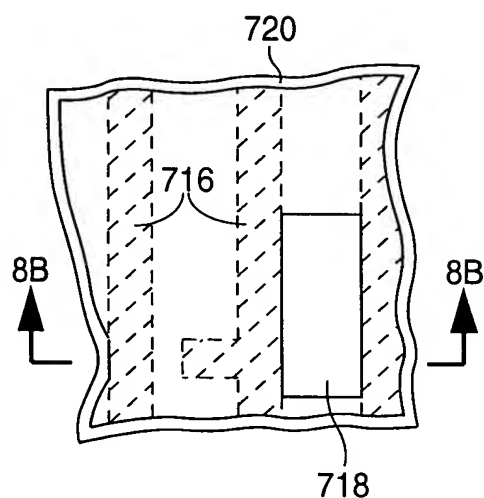


FIG. 8A

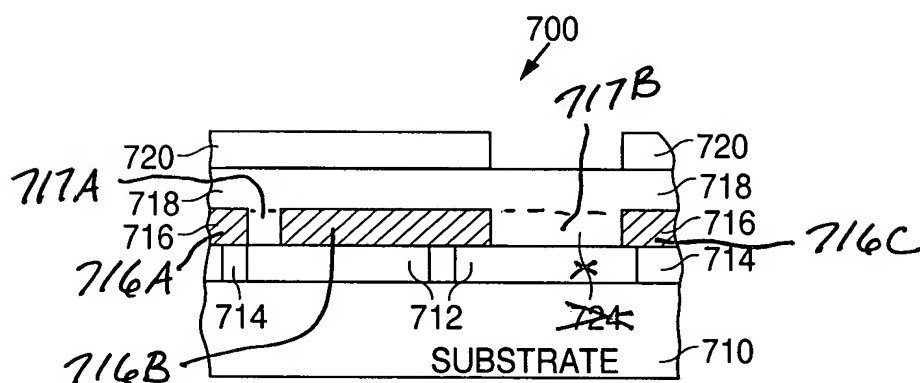


FIG. 7B

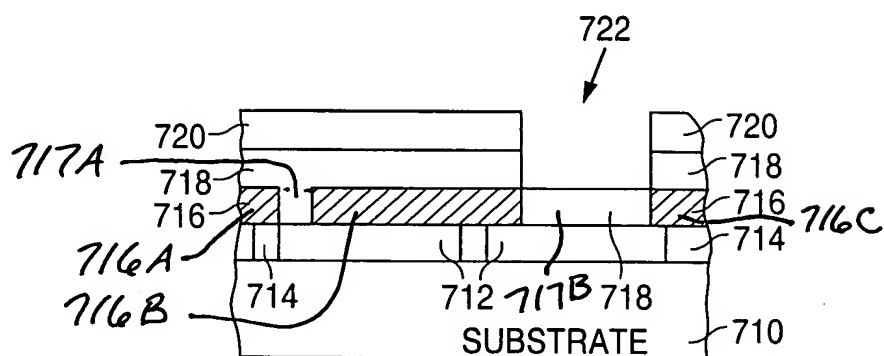


FIG. 8B





Annotated Marked-up Drawing

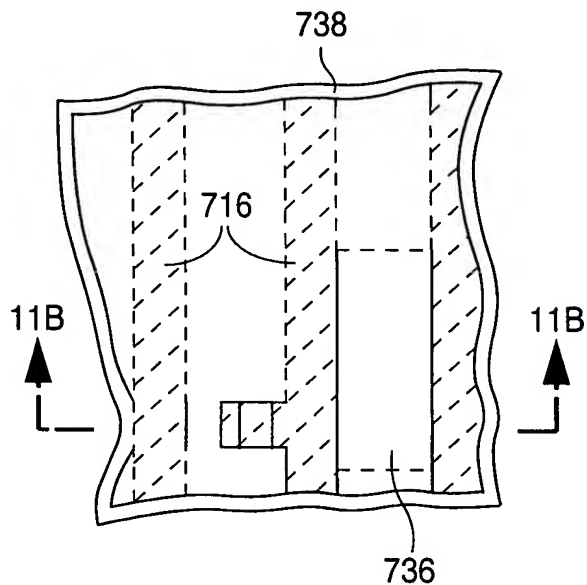


FIG. 11A

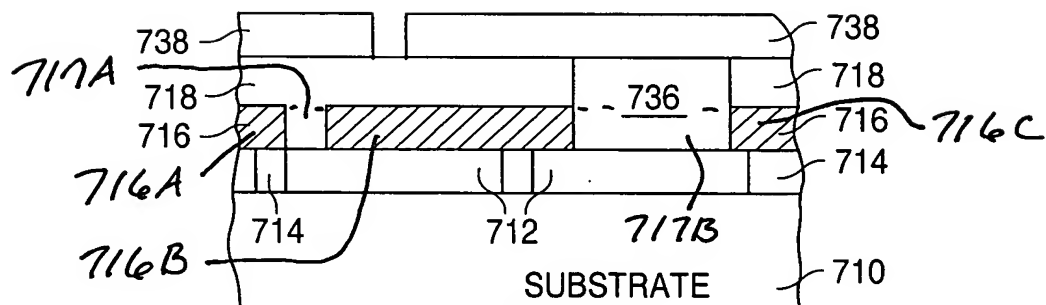


FIG. 11B

